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Amended Claims

1. Method for controlling a wind-up, the method comprising the step of preparing a winding recipe (13) of a roll, which winding recipe comprises winding parameters, **characterized** in that the method comprises the step of determining, based on calculatory and/or experimental models (23), running parameters of the wind-up before the run such that, based on the models (23), the roll will withstand unwinding (24) taking place in an end-use device without being damaged, and that the method comprises the steps of determining the starting data (11), based on which the winding recipe (13) is formed, which winding recipe is iterated by iterating the WOT (Wound-On-Tension) curve (12), of calculating the stresses of the roll and the relaxation (23) of the roll stresses, and, on the basis of the model (23), estimating whether the roll will be damaged and, if necessary, generating a new WOT curve (25) and determining the winding recipe (13) with the help of the WOT model, on the basis of which winding recipe (13) the wind-up (15) is controlled.

2. Method according to claim 1, **characterized** in that the winding recipe is determined as a function of the diameter or radius or the degree of thickness of the cumulated paper on the winding core or as a function of wound web length or the number of laps of the wound web.

3. Method according to claim 1 or 2, **characterized** in that the method comprises the steps of selecting a WOT (Wound-On-Tension) curve (12) on the basis of starting data (11), by means of which curve the winding recipe (13) is determined such that the recipe (13) gives a WOT_{ref} (D) reference curve according to the selected WOT curve and checking, by means of the unwinding model (23), that the rolls will withstand end-use without being damaged (24).

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4. Method according to any one of claims 1 - 3, **characterized** in that, by means of a winding model (14) it is checked, that the rolls will withstand the winding (15).

5. Method according to any one of claims 1 - 4, **characterized** in that the method comprises the steps of carrying out initialization (22) of iteration of the WOT curve for selection of the WOT curve (12) and calculating stresses and relaxation of the roll as well as determining, on the basis of the calculatory model (23), whether the roll will be damaged during end-use and selecting a WOT curve ensuring damage-free end-use (24) of the roll.

6. Method according to any one of claims 1 - 5, **characterized** in that the method comprises the steps of carrying out, based on a WOT model (33), initialization (32) of iteration for selection of the winding recipe (13) and ensuring that the selected WOT curve corresponds to the WOT reference curve and bringing the selected winding recipe into use.

7. Method according to any one of claims 1 - 6, **characterized** in that, during running of the wind-up, a selected winding recipe (42) is loaded into use and, during running, it is monitored whether the measured WOT curve is realized corresponding to the WOT reference curve and, if necessary, a selected winding recipe (46) is corrected.

8. Method according to any one of claims 1 - 7, **characterized** in that the method comprises the steps of measuring internal stress distribution (44) of the rolls and/or calculating, by means of the load model (14), forces directed to the roll during winding and estimating, by means of the model (23), the relaxation of the internal stresses of the roll during transportation as well as calculating, by means of the load model (23), forces directed to the roll in the pa-

per mill customer's finishing device, thereby providing, by means of the model (23), a runnability prediction for the end-use of the roll and determining, on the basis of the model (14, 23) the winding recipe (13) providing damage-free end-use runnability in the finishing device.

9. Method according to any one of claims 1 - 8, **characterized** in that, during running of the wind-up, it is monitored whether a generated WOT (45) curve is realized and, if necessary, the winding parameters (46) are corrected such that the measured WOT curve corresponds to the estimated WOT curve.

10. Method according to any one of claims 1 - 9, **characterized** in that the iteration of the winding recipe (13) in each run is continued and, if necessary, a new WOT curve is determined upon change of paper grade.

11. Method according to any one of claims 1 - 10, **characterized** in that the method comprises the steps of

a) indirectly measuring, in three or two dimensions, the internal stress distribution (44) of the roll being wound up

b) calculating by means of the roll load model (14) the internal stresses caused by forces directed to the roll during winding,

c) estimating (23) the relaxation of the internal stresses of a finished roll before the roll is processed in the paper mill customer's finishing device, and

d) calculating by means of a roll and unwinding device load model the stresses and displacements directed to the roll during unwinding (23).

12. Method according to any one of claims 1 - 11, **characterized** in that in the method the starting data (11) on the paper grade are obtained through off- and

on-line measurements of paper processing equipment preceding the wind-up and through measurements of the slitter-winder itself.

13. Method according to any one of claims 1 - 12, **characterized** in that the limitations for the winding recipe (13) are determined on the basis of basic data obtained through physical properties of the winding device and through the load model (14).

14. Method according to any one of claims 1 - 13, **characterized** in that the method comprises the step of calculating, in structure models of the wind-up and the finishing device, slippages and/or other damage mechanisms generated within the roll.